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# *Indian Standard*

# SPECIFICATION FOR ORGANO MERCURIAL DRY SEED-DRESSING FORMULATIONS

## ( *First Revision* )

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**INDIAN STANDARDS INSTITUTION**
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

**Gr 3** *December* 1984

# *Indian Standard*

# SPECIFICATION FOR ORGANO MERCURIAL DRY SEED-DRESSING FORMULATIONS

## *( First Revision )*

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# AMENDMENT NO. 1 OCTOBER 1985
# TO
# IS:3284-1984 SPECIFICATION FOR ORGANO MERCURIAL DRY SEED-DRESSING FORMULATIONS

*(First Revision)*

[*Page 4, Table 1, Sl No.*(iii), *col 3*] - Substitute '50' *for* '5.0'.

(AFCDC 6)

Reprography Unit, ISI, New Delhi, India

# AMENDMENT NO. 2 MAY 1994
# TO
# IS 3284 : 1984 SPECIFICATION FOR ORGANO MERCURIAL DRY SEED-DRESSING FORMULATIONS

*( First Revision )*

( *Page* 5, *clause* **4.1** ) — Substitute the following for the existing:

'When freshly manufactured material in bulk quantity is offered for inspection, representative samples of the material shall be drawn and tested as prescribed in IS 10627 : 1983 within 90 days of its manufacture. When the material is offered for inspection after 90 days of its manufacture, sampling shall be done as prescribed in IS 10627 : 1983. However, the criteria for conformity of the material when tested, shall be the limits of tolerances, as applicable over the declared nominal value and given under clause **2.3.1** of the standard.'

( FAD 1 )

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**Reprography Unit, BIS, New Delhi, India**

# *Indian Standard*

# SPECIFICATION FOR ORGANO MERCURIAL DRY SEED-DRESSING FORMULATIONS

## *( First Revision )*

## 0. FOREWORD

**0.1** This Indian Standard ( First Revision ) was adopted by the Indian Standards Institution on 28 September 1984, after the draft finalized by the Pest Control Sectional Committee had been approved by the Agricultural and Food Products Division Council and the Chemical Division Council.

**0.2** The formulations based on phenyl mercury acetate and ethyl mercury chloride, either singly or as mixtures, are used extensively in agriculture as seed-dressing agents for the treatment of seeds against fungal and bacterial diseases.

**0.3** The organo mercurial dry seed dressing are generally manufactured to contain 1 percent ( *m/m* ) of mercury.

**0.4** This standard was first published in 1965. It is being revised to update its requirements.

**0.5** In the preparation of this standard, due consideration has been given to the provisions of the *Insecticides Act*, 1968 and the Rules framed thereunder. However, this standard is subject to the restrictions imposed underthese, wherever applicable.

**0.6** For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated expressing the result of a test or analysis, shall be rounded off in accordance with IS : 2-1960*. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

## 1. SCOPE

**1.1** This standard prescribes the requirements and the methods of sampling and test for the seed-dressing formulations based on any one or mixtures of phenyl mercury acetate and ethyl mercury chloride.

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*Rules for rounding off numerical values ( *revised* ).

## 2. REQUIREMENTS

**2.1 Description** — The material shall be in the form of homogeneous reddish powder devoid of lumps and capable of adhering to smooth surface. The active ingredients used in the manufacture of this material shall have been uniformly incorporated in a suitable inert filler.

**2.2** Phenyl mercury acetate, and ethyl mercury chloride employed in the manufacture of this material shall respectively conform to IS : 2126-1973* and IS : 2354-1963†.

**2.3** The material shall also conform to the requirements given in Table 1.

### TABLE 1 REQUIREMENTS FOR ORGANO MERCURIAL DRY SEED-DRESSING FORMULATIONS

| SL No. | CHARACTERISTIC | REQUIREMENT | METHOD OF TEST, REF TO APPENDIX OF THIS STANDARD |
|---|---|---|---|
| (1) | (2) | (3) | (4) |
| i) | Organic mercury content, percent by mass | Nominal value as declared on the container ( *see* **2.3.1** ) | A |
| ii) | Inorganic mercury content, percent by mass, *Max* | 0·01 | A |
| iii) | Sieving requirement: | | |
| | a) Material passing through 75-micron IS Sieve percent by mass, *Min* ( *see* Note ) | 5·0 | B |
| | b) Material passing through 75-micron IS Sieve, after digesting with petroleum hydrocarbon solvent, *Min* | 98·0 | B |

NOTE — Refer IS : 460 ( Part 1 )-1978 'Specification for test sieves: Part 1 Wire cloth test sieves'. BS Test Sieve 200, ASTM Test Sieve 200, Tyler Test Sieve 200 have their apertures within the limits specified for the above IS Test Sieve and may, therefore, be used as 75-micron IS Sieve.

**2.3.1** *Organic Mercury Content* — When determined by the method prescribed in Appendix A the observed organic mercury content, percent ( *m/m* ) of any of the samples shall not differ from the declared nominal value by more than the percent tolerance as indicated below:

| *Nominal Value, Percent* | *Tolerance, Percent* | |
|---|---|---|
| Up to 9 | + 10<br>− 5 | of the nominal value |
| Above 9 and below 50 | ± 5 | |
| 50 and above | + 5<br>− 3 | |

---

*Specification for phenyl mercury acetate, technical ( *first revision* ).

†Specification for ethyl mercury chloride, technical.

**2.3.1.1** The actual value of the organic mercury shall be calculated up to second decimal place for rounding off to first decimal place before applying the tolerances given in **2.3.1.**

**2.3.1.2** The average content of all the samples taken shall be not less than declared nominal content.

## 3. PACKING AND MARKING

**3.1 Packing** — The material shall be packed as per requirements given in IS : 8190 ( Part 1 )-1980*.

**3.2 Marking** — The containers shall be securely closed and shall bear legibly and indelibly the following information in addition to the any other information required under *Insecticides Act* and Rules:

a) Name of the material;
b) Name of the manufacturer;
c) Date of manufacture;
d) Batch number;
e) Net mass of contents;
f) Name(s) of the active ingredient(s) used;
g) Organic mercury content, percent ( *m*/*m* ); and
h) The minimum cautionary notice as worded in the *Insecticides Act* and the Rules.

**3.2.1** The containers may also be marked with the ISI Certification Mark.

NOTE — The use of the ISI Certification Mark is governed by the provisions of the Indian Standards Institution ( Certification Marks ) Act and the Rules and Regulations made thereunder. The ISI Mark on products covered by an Indian Standard conveys the assurance that they have been produced to comply with the requirements of that standard under a well-defined system of inspection, testing and quality control which is devised and supervised by ISI and operated by the producer. ISI marked products are also continuously checked by ISI for conformity to that standard as a further safeguard. Details of conditions, under which a licence for the use of the ISI Certification Mark may be granted to manufacturers or processors, may be obtained from the Indian Standards Institution.

## 4. SAMPLING

**4.1** Representative samples of the material shall be drawn according to IS : 10627-1983†.

## 5. TESTS

**5.1** Tests shall be carried out as prescribed in col 4 of Table 1.

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*Requirements for packing of pesticides: Part 1 Solid pesticides ( *first revision* ).

†Methods for sampling of pesticidal formulations.

**5.2 Quality of Reagents** — Unless specified otherwise, pure chemicals and distilled water ( *see* IS : 1070-1977* ) shall be employed in tests.

NOTE — ' Pure chemicals ' shall mean chemicals that do not contain impurities which affect the results of analysis.

## APPENDIX A

( *Clause* 2.3 )

## DETERMINATION OF ORGANIC AND INORGANIC MERCURY CONTENT

### A-0. METHOD

**A-0.1** In the determination of the organic mercury content, first the total mercury content is determined and then the inorganic mercury content. The difference of these two determinations is the organic mercury content.

### A-1. TOTAL MERCURY CONTENT

### A-1.1 Reagents

**A-1.1.1** *Sulphuric Acid*

**A-1.1.2** *Nitric Acid*

**A-1.1.3** *Potassium Permanganate Solution* — saturated.

**A-1.1.4** *Ferrous Sulphate Solution* — 0·5 N, freshly prepared. Dissolve 14 g of ferrous sulphate ( $FeSO_4.7H_2O$ ) in about 75 ml of water containing 2 ml of concentrated sulphuric acid and make up to 100 ml with water.

**A-1.1.5** *Ferrice Alum Indicator Solution* — 10 percent ( *m/v* ). Dissolve 10 g of ferric ammonium sulphate [ $Fe(NH_4)_2(SO_4)_2.12H_2O$ ] in 100 ml of water containing 10 ml of concentrated nitric acid. Boil vigorously for a few minutes to expel oxides of nitrogen, cool and make up to 100 ml with water.

**A-1.1.6** *Standard Ammonium Thiocyanate Solution* — 0·1 N.

### A-1.2 Procedure

**A-1.2.1** Weigh accurately into a 500-ml Erlenmeyer flask sufficient sample to contain 0·1 to 0·15 g of mercury. Add 60 ml of concentrated sulphuric acid, attach an air condenser about 40 cm in length and 2·5 cm

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*Specification for water for general laboratory use ( *second revision* ).

in diameter to the flask and mix the contents by swirling. Wearing rubber gloves and face shield, add cautiously through the condenser 15 ml of concentrated nitric acid and mix. Heat gently until brown fumes of nitrogen oxide are freely evolved, then heat strongly until white fumes of sulphur trioxide fill the flask and continue heating until they rise into the condenser.

**A-1.2.2** Allow the flask to cool to below 100°C, then finally cool under a stream of cold water to room temperature. Cautiously add 100 ml of water through the condenser in small portions ensuring that the solution is kept thoroughly mixed by continuous swirling. Boil the contents of the flask to expel nitrogen oxides, then again cool under a stream of cold water to room temperature. Add sufficient potassium permanganate solution to produce a distinct purple colour persisting for 5 minutes. ( The volume required should not exceed 1 ml. If this is insufficient, either the oxidation has not been carried out to completion or all oxides of nitrogen have not been boiled out ). Again heat until sulphur trioxide fumes fill the flask and rise into the condenser. Add cautiously a further 5 ml of concentrated nitric acid, heat gently until brown fumes of nitrogen oxides are freely evolved. Then heat strongly until white fumes of sulphur trioxide fill the flask and appear in the condenser. Cool to below 100°C, then finally cool under a stream of cold water to room temperature. Cautiously add 100 ml of water through the condenser in small portions ensuring that the solution is kept thoroughly mixed by continuous swirling. Boil the contents of the flask to expel nitrogen oxides, then again cool under a stream of cold water to room temperature. Add sufficient potassium permanganate solution to produce a distinct purple colour persisting for 5 minutes. ( The volume required should again not exceed 1 ml ).

**A-1.2.3** Neutralize the excess permanganate by adding ferrous sulphate solution drop-wise until the colour is discharged, then titrate with the standard ammonium thiocyanate solution, using 1 ml of ferric alum indicator solution, until a faint brown colouration persists.

### A-1.3 Calculation

$$\text{Total mercury content ( as Hg ), percent by mass} = \frac{10{\cdot}03\ VN}{M}$$

where

$V$ = volume, in ml, of the standard ammonium thiocyanate solution used;

$N$ = normality of the standard ammonium thiocyanate solution; and

$M$ = mass, in g, of the material taken for the test.

## A-2. INORGANIC MERCURY CONTENT

### A-2.1 Reagents

**A-2.1.1** *Dilute Acetic Acid* — 0·5 N.

**A-2.1.2** *Ammonium Hydroxide* — relative density 0·923.

**A-2.1.3** *Bromothymol Blue Indicator Solution* — 0·1 g of bromothymol blue in 98·0 ml of N/50 sodium hydroxide diluted with water to 250 ml.

**A-2.1.4** *Potassium Iodide Solution* — 3 percent ( *m/v* ) and 6 percent ( *m/v* ).

**A-2.1.5** *Copper Ethylenediamine Sulphate Solution* — 5 percent ( *m/v* ). Dissolve 1 g of potassium iodide and 2 g of copper ethylenediamine sulphate in 1 litre of water.

**A-2.1.5.1** Copper ethylenediamine sulphate is prepared as follows:

Add 15 g of copper sulphate ( $CuSO_4.5H_2O$ ) and 32 ml of ethylenediamine to 200 ml of water. Evaporate down in a fume cupboard to about 50 ml and cool. Filter off the crystals on a Buchner funnel, wash twice with 95 percent ethyl alcohol and twice with ether and allow to dry under suction.

**A-2.1.6** *Ethyl Alcohol* — 95 percent.

**A-2.1.7** *Ether* — anhydrous.

### A-2.2 Procedure

**A-2.2.1** Weigh accurately into a 250-ml beaker about 3 g of the material add 50 ml of dilute acetic acid and warm, with stirring, to about 80°C in a well-ventilated fume cupboard. Cool the content to room temperature and filter through a Whatman No. 50 paper or its equivalent on a 7-cm diameter Buchner funnel into a 500-ml filter flask. ( Alternatively, use for this and subsequent filtration stage, an ordinary 500-ml conical flask, fitted to a Buchner funnel by a socket-to-cone adapter and suitably guarded to eliminate any explosion hazard. At each stage treat the filtrate as directed, but omitting transfer from the flask to a beaker. ) Wash the beaker and funnel thoroughly with dilute acetic acid.

**A-2.2.2** Transfer the filtrate to a 400-ml beaker and neutralize with concentrated ammonium hydroxide solution using bromothymol blue indicator solution. Add 50 ml of 6 percent potassium iodide solution, stir well, then filter through a sintered glass funnel ( diameter 6·5 cm, porosity No. 2 ) into a 500-ml filter flask. Wash the precipitate four times with 10-ml portions of 3 percent ( *m/v* ) potassium iodide solution and transfer the filtrate to a 400-ml beaker. Heat the contents of the beaker almost to boiling and then add 10 ml of copper ethylenediamine sulphate solution. Cool to 0°C and allow to stand for at least two hours at this temperature.

**A-2.2.3** Filter off the precipitate on a sintered glass funnel ( 15-ml capacity ) previously brought to constant mass in a vacuum desiccator over freshly prepared alumina desiccant. Wash the precipitate twice with small portions of 95 percent ethyl alcohol and then twice with anhydrous ether. Allow the precipitate to dry under suction for 5 minutes, transfer the crucible to the vacuum desiccator and dry to constant mass ( this should be obtained in 20 minutes ).

### A-2.3 Calculation

$$\text{Inorganic mercury content of the material ( as Hg ), percent by mass} = \frac{22{\cdot}5}{M} \times m$$

where

$m$ = mass, in g, of the precipitate obtained; and
$M$ = mass, in g, of material taken for the test.

## A-3. ORGANIC MERCURY CONTENT

**A-3.1** The percentage of the organic mercury content shall be obtained by subtracting the percentage of inorganic mercury ( **A-2.3** ) from the total mercury content ( **A-1.3** ).

# APPENDIX B

( *Clause* 2.3 )

## TEST FOR SIEVING REQUIREMENT

## B-1. APPARATUS

**B-1.1 Test Sieve** — 75-micron IS Sieve, prepared for the test by removing any film, grease or other water repellent material and their drying.

**B-1.2 Oven** — maintained at 100°C ± 2°C.

## B-2. REAGENTS

### B-2.1 Petroleum Hydrocarbon Solvent

## B 3. PROCEDURE

**B-3.1** Weigh accurately 10·0 g of material and transfer it to the test sieve. Cover the sieve and screen the material in a mechanical sieve shaker for 20 minutes, stop the machine and brush the residue on the sieve into a tared weighing dish and determine the mass of the residue.

**B-3.2** Treat the residue with small quantities of a petroleum hydrocarbon solvent until the washings are clear. Dry the residue to a constant mass at 100° ± 2°C.

## B-4. CALCULATION

**B-4.1** Material passing through 75-micron IS Sieve ( before treating with petroleum hydrocarbon solvent ) percent by mass $= 100 \left( 1 - \frac{m_1}{M} \right)$

**B-4.2** Material passing through 75-micron IS Sieve ( after treating with petroleum hydrocarbon solvent ) percent by mass $= 100 \left( 1 - \frac{m_2}{M} \right)$

where

$m_1$ = mass, in g, of the material retained on the test sieve before treating with petroleum hydrocarbon solvent;

$M$ = mass, in g, of the material taken for the test; and

$m_2$ = mass, in g, of the material left on the test sieve after treating with petroleum hydrocarbon solvent.

# INTERNATIONAL SYSTEM OF UNITS (SI UNITS)

## Base Units

| *Quantity* | *Unit* | *Symbol* |
|---|---|---|
| Length | metre | m |
| Mass | kilogram | kg |
| Time | second | s |
| Electric current | ampere | A |
| Thermodynamic temperature | kelvin | K |
| Luminous intensity | candela | cd |
| Amount of substance | mole | mol |

## Supplementary Units

| *Quantity* | *Unit* | *Symbol* |
|---|---|---|
| Plane angle | radian. | rad |
| Solid angle | steradian | sr |

## Derived Units

| *Quantity* | *Unit* | *Symbol* | *Definition* |
|---|---|---|---|
| Force | newton | N | 1 N = 1 kg.m/$s^2$ |
| Energy | joule | J | 1 J = 1 N.m |
| Power | watt | W | 1 W = 1 J/s |
| Flux | weber | Wb | 1 Wb = 1 V.s |
| Flux density | tesla | T | 1 T = 1 Wb/$m^2$ |
| Frequency | hertz | Hz | 1 Hz = 1 c/s ($s^{-1}$) |
| Electric conductance | siemens | S | 1 S = 1 A/V |
| Electromotive force | volt | V | 1 V = 1 W/A |
| Pressure, stress | pascal | Ps | 1 Pa = 1 N/$m^2$ |

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